



*United States
Environmental Protection Agency
Region IX*

Record of Decision

for

Dual Site

Groundwater Operable Unit

**Montrose Chemical and Del Amo
Superfund Sites**

Volume I:

Declaration and Decision Summary

*Prepared By
Jeff Dhont
Remedial Project Manager
March 1999*

This page left blank intentionally

**Record of Decision: Dual Site Groundwater Operable Unit
Montrose Chemical and Del Amo Superfund Sites**

Contents*

VOLUME 1: Declaration and Decision Summary

Part I: Declaration	1
Part II: Decision Summary	1-1
Section 1: Site Names and Location	1-1
Section 2: Site History and Background	2-1
2.1: Former Montrose Chemical Corporation Plant	2-1
2.2: Enforcement Activities Related to the Montrose Superfund Site	2-3
2.3: The Former Del Amo Synthetic Rubber Plant	2-4
2.4: Enforcement Activities Related to the Del Amo Superfund Site	2-5
2.5: Enforcement History Related to the Joint Groundwater Remedial Effort	2-6
2.6: Contaminant Sources Other Than The Montrose Chemical And Del Amo Plants	2-7
Section 3: Community Highlights	3-1
3.1: Communities and General Community Involvement	3-1
3.2: Information Repository	3-2
3.3: Community Involvement Activities Specific To The Proposed Plan For the Groundwater Remedial Actions Selected By This ROD	3-2

* Contents for both volumes of this ROD are shown. This is Volume 1. Volume 2 is under separate cover.

Section 4: Context, Scope and Role of the Remedial Action	4-1
4.1: Dual Site Basis And Approach	4-2
4.2: Site-Wide Context Of This Operable Unit	4-3
4.3: The Problem Posed By NAPL At The Joint Site	4-3
4.4: Use Of A Containment Zone For NAPL	4-5
4.5: Two Phases of Remedy Selection to Address Groundwater and NAPL	4-5
4.6: Finalization of the Del Amo Waste Pits ROD	4-8
Section 5: Major Documents	5-1
Section 6: Definition of the Term <i>Joint Site</i>	6-1
Section 7: Site Characteristics	7-1
7.1: Extent and Distribution of Contamination	7-1
Driving Chemicals of Concern for Remedy Selection Purposes	7-1
Non-Aqueous Phase Liquids (NAPL)	7-2
Hydrostratigraphic Units and Groundwater Flow	7-6
Generalized Dissolved Contaminant Distributions	7-7
7.2: Conventions for Dividing the Contamination Into Plumes	7-9
7.3: Presence of Intrinsic Biodegradation	7-12
Potential for Intrinsic Biodegradation in the Benzene Plume	7-12
Potential for Intrinsic Biodegradation in the Chlorobenzene Plume	7-13
Potential for Intrinsic Biodegradation in the TCE Plume	7-14
7.4: Land Use and Zoning	7-14
7.5: Groundwater Use and Designations	7-15

Section 8: Summary of Groundwater-Related Risks 8-1

8.1:	Two Methods of Risk Characterization: Complexities in Characterizing Groundwater Risks	8-1
8.2:	Summary of Factors for Toxicity Assessment and Exposure Assessment	8-4
8.3:	Summary of Risks	8-6
8.4:	Risk Status of para-Chlorobenzene Sulfonic Acid (pCBSA)	8-6
8.5:	Basis for Action	8-8

Section 9: Remedial Action Objectives 9-1

9.1:	In-Situ Groundwater Standards (ISGS)	9-1
9.2:	Remedial Action Objectives	9-4

**Section 10: Technical Impracticability Waiver
and Containment Zone 10-1**

10.1:	Introduction and Provisions	10-1
10.2:	Summary of Why NAPL Areas Cannot Be Restored to Drinking Water Standards	10-3
10.3:	Non-NAPL Contaminants in the TI Waiver Zone	10-4
10.4:	Extent and Configuration of the TI Waiver Zone	10-5
	Chlorobenzene Plume	10-6
	Benzene Plume in the UBF and MBFB Sand	10-7
	TCE Plume in the UBF and MBFB Sand	10-10
	Benzene and TCE Plume in the MBFC Sand	10-10

Section 11: Description and Characteristics of Alternatives 11-1

11.1: Foundation and Context for Alternatives	11-2
Consideration of Potential for Adverse Migration	11-2
The Joint Groundwater Model	11-5
Key Findings of the Joint Groundwater FS	11-8
Potential for Reliance on Monitored Intrinsic Biodegradation	11-9
Basis for Using One Option for the TCE Plume in All Alternatives	11-14
11.2: Characterizing Time Frames and Efficiencies	11-17
Long Time Frames and How to Time to Achieve Objectives is Characterized	11-17
Early Time Performance	11-19
Pore Volume Flushing	11-19
11.3: Elements Common to All Alternatives	11-20
Containment Zone and Restoration Outside Containment Zone	11-20
Contingent Actions	11-20
Monitoring	11-21
Additional Data Acquisition	11-21
Institutional Controls	11-22
Common Elements for the Chlorobenzene Plume	11-24
Common Elements for the Benzene Plume	11-25
Common Elements for the TCE Plume	11-25
Actions for the Contaminant pCBSA	11-27
11.4: Differentiating Description of Alternatives	11-28
Alternative 1	11-28
Introduction to Alternatives 2 Through 5	11-29
Alternative 2	11-30
Alternative 3	11-30
Alternative 4	11-31
Alternative 5	11-31

11.5: Treatment Technologies and Treated Water Discharge	11-32
Locations of Treatment and Number of Treatment Plants	11-32
Primary Treatment Technologies	11-32
Treatment Trains	11-33
Ancillary Technologies	11-34
Cost-Representative Treatment Trains	11-34
Supplemental Technologies	11-35
Discharge Options	11-35

**Section 12: Comparative Analysis of
Alternatives & Rationale for Selected Alternative ... 12-1**

12.1: Protectiveness of Human Health and the Environment	12-2
12.2: Compliance with ARARs	12-6
12.3: Long-Term Effectiveness	12-7
12.4: Short-Term Effectiveness	12-11
12.5: Reduction of Mobility, Toxicity, or Volume of Contaminants Through Treatment	12-12
12.6: Implementability	12-13
12.7: Cost	12-14
12.8: State Acceptance	12-15
12.9: Community Acceptance	12-15
12.10: Rationale for EPA's Selected Alternative	12-16
Rationale with Respect to the Chlorobenzene Plume	12-17
Rationale with Respect to the Benzene Plume	12-19
Rationale for Remedial Actions for pCBSA	12-21
Finalizing the Del Amo Waste Pits ROD	12-24

Section 13: Specification of the Selected Remedial Action: Standards, Requirements, and Specifications	13-1
Section 14: Statutory Determinations	14-1
14.1: Protection of Human Health and the Environment	14-1
14.2: Compliance with ARARs	14-3
14.3: Cost Effectiveness	14-3
14.4: Utilization of Permanent Solutions and Alternative Treatment Technologies To the Maximum Extent Practicable	14-5
14.5: Preference for Treatment as a Principal Element	14-6
Section 15: Documentation of Significant Changes	15-1

VOLUME 2: Response Summary

Part III: Response Summary

Section R1: Responses to Oral Comments Received During The Public Meeting	R1-1
Section R2: Responses to Short Written Comments Received By EPA	R2-1
Section R3: Responses to Written Comments Received From Montrose Chemical Corporation of California	R3-1
Section R4: Responses to Written Comments Received From The Del Amo Respondents	R4-1
Section R5: Responses to Written Comments Received From PACAAR, Inc.	R5-1

Acronyms

AOC	Administrative Order on Consent
ARARs	applicable or relevant and appropriate requirements
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BHC	benzene hexachloride
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Act Information System
C.F.R.	Code of Federal Regulations
CIC	community involvement coordinator
CPA	Central Process Area of the former Montrose Plant
CPF	cancer potency factor
DCA	dichloroethane
<i>*See below</i>	
DCE	dichloroethylene
DDT	dichlorodiphenyl-trichloroethane
DNAPL	dense nonaqueous phase liquid
Dow	Dow Chemical Corporation
DTSC	California Department of Toxic Substances Control
FBR	Fluidized Bed Reactor
FSP	field sampling plan
FTC	focused transport calibration
gpm	gallons per minute
GSA	United States General Services Administration
ISGS	in-situ groundwater standards
JGWFS	Joint Groundwater Feasibility Study
JGWRA	Joint Groundwater Risk Assessment
LBF	Lower Bellflower Aquitard
LGAC	liquid-phase granular activated carbon
LNAPL	light nonaqueous phase liquid
MBFB Sand	Middle Bellflower "B" Sand
MBFC Sand	Middle Bellflower "C" Sand
MBFM	Middle Bellflower Muds
MCL	maximum contaminant level (promulgated drinking water standard)
µg/L	micrograms per liter
mg/kg/day	milligrams per kilogram per day
mg/L	milligrams per liter
NAPL	nonaqueous phase liquid

NCEA	National Center for Exposure Assessment
NCP	National Contingency Plan
NOEL	No Observed Adverse Effect Level
NRRB	National Remedy Review Board
O&M	operations & maintenance
OSHA	Occupational Safety and Health Administration
pCBSA	para-chlorobenzene sulfonic acid
PCE	perchloroethylene
ppb	parts per billion
PRG	Preliminary Risk Goal
PRP	potentially responsible party
QAPP	Quality Assurance Project Plan
RCRA	Resource, Conservation and Recovery Act
RfD	reference dose
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
RME	reasonable maximum exposure
RMS	root mean square
ROD	Record of Decision
ROST™	Rapid Optical Screening Tool
RPM	remedial project manager
Shell	Shell Oil Company
SVE	soil vapor extraction
TBC	To-Be-Considered Criterion
TCA	trichloroethane
TCE	trichloroethylene
TDS	total dissolved solids
TI	technical impracticability
UBF	Upper Bellflower
U.S.C.	United States Code
VOCs	volatile organic compounds

*Note: The term “Del Amo Respondents” refers to Shell Oil Company and Dow Chemical Company, collectively.

I. DECLARATION

*Statutory Preference for Treatment
as a Principal Element is Met
and Five Year Reviews Are Required*

1. Site Name and Location

This Record of Decision (ROD) applies to *both* the Montrose Chemical Superfund Site and the Del Amo Superfund Site, in Los Angeles County, California. Portions of these sites lie within the City of Los Angeles, and adjacent to the City of Torrance, California.

2. Statement of Basis and Purpose

This ROD presents the selected remedial action for (1) groundwater contamination, and (2) isolation and containment of non-aqueous phase liquids (NAPL) at the Montrose Chemical and Del Amo Superfund Sites. EPA has selected this remedy in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, 42 U.S.C. §9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act of 1986, P.L. 99-499, 100 Stat. 1613 (1986) (CERCLA) and with the relevant provisions of the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 (NCP). This decision is based on consideration of the administrative record, including public comments and the detailed analysis of the alternatives which are discussed and summarized in the Decision Summary.

This ROD establishes a *dual-site operable unit remedy*. This operable unit remedy is anticipated to be consistent with any other operable unit remedies, and the final remedies, for both the Montrose Chemical Superfund Site and the Del Amo Superfund Site. Such other remedies may apply to one or the other site individually, in contrast to the dual-site nature of this remedy.

This document identifies applicable or relevant and appropriate requirements (ARARs) and other criteria and requirements which shall be met in implementing this remedy. During investigations of the Montrose Chemical and Del Amo Superfund Sites, data has been collected in accordance with approved sampling and quality assurance management plans. EPA considers site data to be of adequate quality to support the remedy presented in this ROD. Remedial designs, actions, and operation and maintenance undertaken in the course of implementing this remedy shall comply with all standards, requirements and specifications in this ROD.

The State of California, acting by and through its Department of Toxic Substances Control, concurs with the remedy selected in this document.

The authority to select CERCLA remedial actions has been delegated to the U.S. EPA Region IX Superfund Division Director (*See U.S. EPA CERCLA Delegations Manual, Delegation 14.5 (April 15, 1994) and redelegated by EPA Region IX Delegation Order, Selection of Remedial Actions (September 29, 1997)*).

3. Assessment of the Site

Releases of hazardous substances, pollutants or contaminants from the former DDT pesticide manufacturing plant operated by Montrose Chemical Corporation, including but not limited to chlorobenzene, DDT, and parachlorobenzene sulfonic acid, have resulted in hazardous substances contamination in the groundwater. Releases of hazardous substances from the former Del Amo Synthetic Rubber Manufacturing plant, including but not limited to benzene, ethylbenzene, and naphthalene have resulted in hazardous substances contamination in the groundwater. Releases of hazardous substances including but not limited to benzene, trichloroethylene (TCE), perchloroethylene (PCE), and dichloroethylene (DCE) have occurred potentially as a result of the operations at both the former Montrose Chemical and Del Amo plant properties and otherwise as a result of the operations of additional facilities in the immediately surrounding area. These releases have also resulted in groundwater contamination. Some of the hazardous substances discussed above are present below the ground surface in the form of non-aqueous phase liquids (NAPL) as well as dissolved in water and adsorbed to soils.

Contamination in groundwater from the two sites has partially commingled, or merged. Remedial actions selected for the contamination originating from either site individually would affect the contamination, execution, and implications of remedial actions selected for the contamination originating from the other site. The groundwater contamination from both sites is being addressed by EPA as a single technical problem with a unified remedial strategy which has been developed in part by considering the interrelationships of the various areas of groundwater at the Montrose Chemical and Del Amo Superfund Sites.

The groundwater contamination at and from the former Montrose and Del Amo plant properties; and the contamination from additional sources that is commingled, or within the area that might be subject to significant hydraulic influences from this remedy; are collectively referred to by EPA as “the Joint Site.” This term is being used only with respect to this selected groundwater remedy. Additional description and caveats pertaining to the use of this term are provided in the Decision Summary of this ROD. Unless otherwise noted, where used in this ROD the term “both sites,” shall refer to the Montrose Chemical Superfund Site and the Del Amo Superfund Site.

Actual or threatened releases of hazardous substances from both the Montrose Chemical Superfund Site and the Del Amo Superfund Site, if not addressed by implementing the response actions selected in this ROD, may present an imminent and substantial endangerment to public

health, welfare, or the environment.

4. Description of the Remedy

The implementation of the remedial actions selected by this ROD shall meet the description and all specifications and requirements as provided in this section, and the accompanying Decision Summary. The Decision Summary contains more detail on remedy description.

The primary principal threat at both of these sites related to groundwater is the NAPL which continues to dissolve into the groundwater. The dissolved contamination in the groundwater poses an unacceptable potential human health risk over the long term.. This selected remedial action is the first of two phases of remedial decisionmaking for the groundwater operable unit of the Montrose Chemical and Del Amo Superfund Sites. This ROD selects remedial actions that will:

- Contain the principal threat by containing the dissolved-phase groundwater contamination that surrounds the NAPL, thereby isolating the NAPL;
- Reduce the concentrations of dissolved contaminants in groundwater, outside the area of groundwater being contained, to levels that no longer pose an unacceptable health risk; and
- Prevent human exposure to groundwater contamination at these Superfund sites.

The containment of the principal threat shall be accomplished by (1) hydraulic extraction and treatment (with aquifer injection), and (2) reliance on intrinsic biodegradation, a form of natural attenuation. The manner in which each of these shall be applied is specified in the Decision Summary.

The reduction of concentrations of dissolved contaminants outside the area of groundwater being contained shall be accomplished by hydraulic extraction, treatment, and aquifer injection. This reduction shall occur at rates and meet time- and efficiency-based performance requirements specified in the Decision Summary. Some treated water may under this remedial action also may be discharged under permit to surface water channels. Provisions for institutional controls, monitoring, additional data acquisition, acceptable forms of groundwater treatment, and waivers of certain ARARs based on technical impracticability, shall also apply to this remedial action as specified in the Decision Summary.

EPA has determined that the remedial action selected in this ROD is protective of human health and the environment. However, the remedial action selected by this ROD does not remove

NAPL from the ground nor immobilize it. As extensively discussed in the Decision Summary, the remedial action selected by this ROD will remain in place over an extended time frame. The existing mass of NAPL and the potential for NAPL migration create significant uncertainties that the remedial action selected in this ROD will continue to remain protective of human health and the environment over the long term. To address such uncertainties, EPA will undertake a second phase of remedial decisionmaking for this groundwater operable unit, which will address whether and to what degree NAPL shall be recovered (removed) from the ground and/or immobilized at each of the two sites. Recovery and/or immobilization of the NAPL may enhance the long-term effectiveness of the remedial action selected in this ROD and may reduce these long-term uncertainties. If, as a result of such evaluations, EPA determines that additional remedial actions are required, EPA will select the second phase remedial actions in an *amendment* to this ROD. EPA may issue such an amendment, if any, as a stand-alone document or within the framework of another ROD for the Montrose and Del Amo site, including final site-wide ROD(s) which may be issued.

Performance of the second phase of remedial selection is authorized by and consistent with the NCP provision at 40 C.F.R. 300.430(f)(5)(iii)(D) which provides that the ROD may:

...When appropriate, provide a commitment for further analysis and selection of long-term response measures within an appropriate time frame.

This operable unit ROD finalizes the interim provisions of the operable unit ROD that EPA issued for the Del Amo Waste Pits on September 5, 1997, as specified and described in detail in the Decision Summary. These provisions were designed to control the Waste Pits as a source of continuing contamination to groundwater.

Remedial Actions

Three areas of groundwater at the Joint Site are defined by convention in the Decision Summary of this ROD, as the ***chlorobenzene plume***, the ***benzene plume***, and the ***TCE plume***. This ROD establishes differing remedial requirements and objectives for each of these plumes, within the context of the overall remedial action, as discussed in the Decision Summary. The Decision Summary provides numerous details and additional specifications related to each of the following elements which are incorporated in this Declaration by reference. In addition, the Decision summary includes specifications for the monitoring and evaluation of the performance of the remedial action, for the chemical pCBSA, for actions to be taken during the course of the remedial action, and other specifications.

The remedy shall consist of the following actions and meet the following requirements, as further discussed and developed later in this ROD:

- Dissolved phase contamination in a specifically-bounded, monitored zone of groundwater, as defined in the Decision Summary, shall be contained and isolated indefinitely such that the contamination cannot escape the zone. This zone is referred to by this ROD as the **containment zone**.¹ By containing the dissolved phase contamination surrounding the NAPL, this action isolates the NAPL from the remainder of groundwater.
- Specific ARARs shall be waived due to technical impracticability (“TI waiver”). The waived ARARs are identified in Appendix A of the ROD. The TI waiver of these ARARs shall apply solely to a zone of groundwater that is defined in the Decision Summary of this ROD and is referred to as the **TI waiver zone**. The TI waiver zone and the containment zone are congruent and refer to the same physical space.
- Contaminants within the containment zone shall be contained by two methods: (1) groundwater extraction and treatment, and (2) monitored intrinsic biodegradation. The method which shall apply shall differ for various portions of groundwater, as specified and in accordance with all requirements and provisions in the Decision Summary.
- The concentrations of dissolved phase contaminants in all groundwater at the Joint Site that lies *outside* the containment zone shall be reduced to concentrations at or below standards identified and discussed in the Decision Summary of this ROD in a reasonable time frame. These standards are referred to by this ROD as **in-situ groundwater standards**, or **ISGS**. This reduction shall be accomplished by extraction and treatment of groundwater. This requirement does not apply to the chemical pCBSA. Special actions for pCBSA are discussed in the Decision Summary.
- The reduction of the volume of water outside the containment zone that is contaminated at concentrations above ISGS levels shall be achieved at the groundwater extraction rates and in accordance with the performance standards, requirements, and provisions in the Decision Summary.
- The remedial action shall, while still meeting all other requirements and objectives of the remedial action as specified by this ROD, limit inducing adverse migration of NAPL (residual phase) contaminants. Additional definitions and exceptions with respect to this requirement are provided in the Decision Summary.

¹The use of the term “containment zone” in this ROD does not reflect a formal establishment of a containment zone as that term is used in, and per the requirements of, California State Water Resources Control Board Resolution No. 92-49(III)(H).

- The remedial action shall, while still meeting all other requirements and objectives of this remedial action as specified by this ROD, limit the migration of existing contamination where such migration would be of a nature that would lengthen the remedial action, result in a greater potential health risk, or result in spreading of the contamination. Additional definitions and exceptions with respect to this requirement are provided in the Decision Summary.
- Any of several technologies (or combinations of those technologies), identified in the Decision Summary shall be considered acceptable for treatment as determined in the remedial design phase. This remedy shall attain all ARARs identified by this ROD that pertain to any of the technologies that are actually implemented.
- For the chlorobenzene and TCE plumes, groundwater shall be injected back into the aquifers after treatment to standards selected in this ROD. Additional specifications are provided in the Decision Summary.
- For the benzene plume, after treatment groundwater shall be discharged after treatment in one of the following ways as determined in the remedial design phase: (1) discharge to the storm sewer, (2) discharge to the sanitary sewer, or (3) aquifer injection. The discharge shall meet all ARARs identified in this ROD and any independently applicable standards for such discharges.
- Contingent actions, as put forth in the Decision Summary, shall be implemented in the event that the remedial action does not contain groundwater contamination within the containment zone.
- The hydraulics of the affected groundwater aquifers, the nature, extent, fate, and transport of contamination, and compliance with the requirements of this ROD, shall be continually monitored in accordance with the objectives, requirements and provisions presented in the Decision Summary.
- Existing drinking water production wells in the vicinity of the Joint Site shall be routinely monitored for the contaminants from the Joint Site and actions shall be taken to ensure that contamination from the Joint Site does not enter the potable water supply, as provided in the Decision Summary.
- Additional field data shall be acquired during the remedial design phase, including monitoring well data from new and existing monitoring wells, well surveys, aquifer tests, and other data as required and as specified in the Decision Summary.
- Institutional controls are identified in Sections 11 and 13 of the Decision Summary to

reduce the potential for groundwater use in the area of contaminated groundwater presently and during the course of the remedial action and to limit the potential for the spreading of existing contamination during the course of the remedial action.

5. Statutory Determinations

The selected remedy is protective of human health and the environment. In addition, as required by the terms of this ROD, EPA will conduct a second phase of remedial decisionmaking for this operable unit to address unresolved uncertainty regarding whether certain remedial actions selected in this ROD will continue to remain protective of human health and the environment over the long term. This second phase of remedial decisionmaking will address whether and to what degree NAPL recovery and/or NAPL immobilization shall occur at the Montrose Chemical and Del Amo Superfund Sites.

The selected remedy complies with Federal and State requirements that are legally applicable or relevant and appropriate (ARARs) to the remedial action, except where such ARARs have been waived. The waiver of certain ARARs, which are identified in Appendix B and explained in the Decision Summary of the ROD, is justified due to technical impracticability. This waiver applies to a specific zone of groundwater identified by the Decision Summary.

The selected remedy is cost effective and utilizes permanent solutions and alternative treatment technology to the maximum extent practicable, and satisfies the statutory preference for remedies that employ treatment that reduces the mobility, toxicity, or volume as a principal element.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of the remedial action, and again every five years subsequently for as long as hazardous substances remain on-site, to ensure that the remedy continues to provide adequate protection of public health or welfare or the environment. As part of these reviews, EPA shall evaluate toxicological studies which may have been performed since the issuance of this ROD to determine whether remedial actions selected in this ROD to address the groundwater contaminant pCBSA remain protective of human health and the environment. This discussed in detail in the Decision Summary of this ROD.

Keith Takata, Director
Superfund Division
United States Environmental Protection Agency, Region IX

Date